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# HEALTH INFORMATION

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## Sunscreen 101

Sunscreens are products combining several ingredients that help prevent the sun's ultraviolet (UV) radiation from reaching the skin.

Primary protection is best achieved by staying out of the sun, seeking cover or shade and wearing protective clothing including hats that shade the face and neck, long sleeve shirts and long pants. Appropriate use of broad-spectrum UVA/UVB sunscreen could be considered a significant secondary adjunct to physical forms of UV protection. Reapply adequate amounts of sunscreen every 2 hours or sooner if you are on the sand, playing in water or sweating.

### UV Radiation

Two types of ultraviolet radiation UVA and UVB damage the skin, age it prematurely, and increase your risk of skin cancer. UVB is the chief culprit behind sunburn (reddening). UVA is less energetic than UVB but is more abundant and penetrates deeper into the skin where it interacts with endogenous and exogenous photo-sensitisers to generate reactive oxygen species that damage cellular DNA, lipid membranes, and proteins. UVA also suppresses immune function. As a result, UVA exposure contributes to photo-carcinogenesis and photo-ageing (including wrinkling, leatherying and pigmentation). UVA also exacerbates the carcinogenic effects of UVB rays, and increasingly are being seen as a cause of skin cancer on their own.



### UV Index

The UV index is an international standard measurement of UV radiation strength at a specific location and time of day. The Bureau of Meteorology (BOM) provides UV index values for locations across Australia on a daily basis, ranging from peak values of 1 or 2 during the winter months in the south, to peak values of > 13 during the summer months in the north. A UV index value of 12 indicates that sunburn typically occurs in about 12 minutes in fair-skinned individuals, a value of 6 indicates a typical burn time of 24 minutes, etc; however, it must be remembered that the index is a guide only and other factors (e.g. skin type) need to be taken into account. Further details including UV Alerts can be found at <http://www.bom.gov.au/australia/uv/>.

### What Is SPF?

Your skin has a natural SPF, partially determined by how much melanin you have, or how darkly pigmented your skin is. Sun Protection Factor (SPF) is a measure of a sunscreen's ability to prevent UVB from damaging the skin. It's a number that you can use to help determine how long you can stay in the sun before getting 100% of a sunburn dose of UVB.

SPF does not indicate protection against UVA. For a product to claim broad-spectrum protection (UVB and UVA protection), UVA protective factor is required to be  $\geq 1/3$  of the labelled SPF and/or protection against a critical wavelength of  $\geq 370\text{nm}$ . No sunscreen can block all UV rays.

Another way to look at it is in terms of percentages: SPF 15 filters out approximately 93 percent of all incoming UVB rays. SPF 30 keeps out 97 percent and SPF 50 keeps out 98 percent. These small increases make a big difference if you are light-sensitive or have a history of skin cancer.



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**Here's how it works:** If it takes 10 minutes for your unprotected skin to start turning red (100% dose), using an SPF 15 sunscreen theoretically prevents reddening 15 times longer, about 2.5 hours ( $15 \times 10 = 150$  minutes). Using an SPF 30 will take 5 hours ( $30 \times 10 = 300$  minutes). But more importantly at 10 minutes only 3,3% of radiation has been absorbed using an SPF 30 and 6,6% if you used an SPF 15. At 2 hours 80% has been absorbed if you used an SPF 15 but only 40% if you used an SPF 30.

But there are problems with the SPF model. Firstly, no sunscreen regardless of strength should be expected to stay effective longer than two hours without reapplication. In addition, it is important to note that once the sunburn threshold dose has been exceeded (100% burn time) further application of sunscreen will not prevent its manifestation.

Secondly, "reddening" of the skin is a reaction to UVB rays alone and tells you little about what UVA damage you may be getting. Plenty of damage can be done without the red flag of sunburn being raised.

### **Who Should Use Sunscreen?**

Anyone over the age of six months should use a sunscreen daily. Even those who work inside are exposed to ultraviolet radiation for brief periods throughout the day, especially if they work near windows, which generally filter out UVB but not UVA rays. Children under the age of six months should not be exposed to the sun, since their skin is highly sensitive to the chemical ingredients in sunscreen as well as to the sun's rays. Shade and protective clothing are the best ways to protect infants from the sun.

### **How do they work?**

Sunscreens protect the skin from UV radiation via two distinct methods – reflection and absorption of UV radiation. Agents that reflect UV radiation (zinc oxide and titanium dioxide) are normally inorganic opaque ointments whilst microfine titanium dioxide is more cosmetically acceptable, but can still leave a milky appearance on the skin. Chemicals used in sunscreens that primarily absorb UVA/B radiation are organic and have greater cosmetic appeal than those that reflect UV radiation, as they are not visible once applied to the skin. Multiple UV absorbing/reflecting chemicals often constitute a sunscreen product to screen out a broad spectrum of UV radiation.

### **Ingredients**

The temporary protection against UV provided by sunscreens is due to their active ingredients, which are classified into organic or inorganic UV filters. Organic filters, such as the cinnamates and salicylates, are aromatic compounds that absorb UV. Inorganic filters are minerals, zinc oxide and titanium dioxide, that absorb, reflect, and scatter UV.

Many of the chemicals used in sunscreens to filter UV radiation are photoreactive and result in the formation of photoproducts over time as a result of light exposure. Some photoproducts can filter UV radiation. The photostability of sunscreen agents can also depend on the other ingredients, including other UV filters and solvents. Newer UV filters used in sunscreens tend to be more photostable, while others can be made photostable by other UV filters or technologies. An example is avobenzene, one of the best agents for filtering UVA radiation but has poor photostability, has been photostabilised with oxybenzone, which also adds additional UVA filtering and diethylhexyl 2,6-naphthalate (DEHN); additional UVB filters are also often added to increase the effective SPF. Sunscreens providing inadequate protection in the UVA spectrum are probably due mainly to the inclusion of octinoxate, which is known to enhance avobenzene photodegradation.

Another important aspect of a sunscreen's performance is resistance to water immersion and sweating. Testing for water resistance in Australia has required application of the sunscreen to volunteers who then spend time in a spa pool at 31–35°C.



Newer sunscreen technologies include entrapment of active sunscreen ingredients within a silica shell (microencapsulation), which reduces direct skin contact and associated potential for allergic reactions, and also helps improve compatibility between different ingredients. Polymer materials that enhance the effectiveness of the active ingredients may also be used, specifically 'sunspheres', which are tiny styrene/acrylates filled with water that are released upon skin contact and scatter UV radiation thereby increasing its probability of contact with the active ingredients. The SPF can be increased by 50–70% with such technologies. New vehicles mean sunscreen chemicals are also better distributed along the skin surface than was the case with conventional formulations.

### **What Type of Sunscreen Should I Choose?**

The answer depends on how much sun exposure you're anticipating however we recommend SPF 50. In all cases experts recommend a broad-spectrum, water-resistant, beachwear-type sunscreen that holds together on your skin. The "water resistant" and "very water resistant" types are also good for hot days or while playing sports, however, these sunscreens may not be as good for everyday wear. They are stickier, don't go as well with makeup and need to be reapplied every two hours.

When choosing the best sunscreen, there are important things to look for on the label. All UV filtering agents used in sunscreen products degrade with age so all sunscreen products should have an expiry date, never buy a sunscreen product without one. Sunscreens should be discarded 12 months after opening irrespective of expiry date. Discard any sunscreen that has been exposed to the sun or excessive heat as the protection is diminished. When buying sunscreen for children, consider sensitive-skin formulations (particularly for babies). Check for evidence of testing against the AS/NZ Standard. Avoid using any sunscreen product found that uses the term 'sunblock', 'waterproof' or 'sweatproof' as these do not meet the standard.

### **How Much Sunscreen Should I Use and How Often Should I Put it On?**

For a sunscreen product to provide the full protection it claims, it needs to be applied liberally 15–30 minutes before going outside to allow time for it to dry and be absorbed into the skin.

A good guide for achieving adequate coverage for an adult is to apply at least half a teaspoon to each arm and the face (including the ears and neck), and at least a full teaspoon to each leg, the front of body and the back of body; 35mL in total for the entire body.

Experts recommend application of the total dose on several uniformly spaced spots for each body segment; and spread using circular movements, spread for an even application for each body segment.

Reapplication should be undertaken every 2 hours while outdoors or immediately following swimming or sweating heavily.

A local study done in Nambour Queensland indicated that regular daily use of sunscreen may prevent melanoma, reduce the risk of development of Squamous Cell Carcinoma's (SCC's) as well as protecting against the development of Actinic Keratosis (Solar Keratosis) and photodamage/photoageing.

### **Common Myths**

- ***Wearing sunscreen can cause vitamin D deficiency.***

There is some controversy regarding this issue, but few dermatologists believe (and no studies have shown) that sunscreens cause vitamin D deficiency. Also, vitamin D is available in dietary supplements and foods such as salmon and eggs, as well as enriched milk and orange juice.

- ***If it's cold or cloudy outside, you don't need sunscreen.***

This is not true. Up to 40 percent of the sun's ultraviolet radiation reaches the earth on a completely cloudy day. This misperception often leads to the most serious sunburns, because people spend all day outdoors with no protection from the sun.





Eighty percent of your sun exposure comes as a child, so it's too late to do anything now. It appears that this universally promoted idea was based largely on a misinterpretation. A recent multi-center study showed that we get less than 25 percent of our total sun exposure by age 18.

- **Sunscreen Is not safe.**

Questions have been raised in recent years about the safety of sunscreens. The claims have focussed on the production of reactive oxygen species by nanoparticles from zinc oxide or titanium dioxide penetrating the skin barrier, and also the creation of free radicals as the result of degradation of a number of other sunscreen ingredients. Some sunscreens have had antioxidants added to help neutralise these free radicals. The best available evidence indicates that nanoparticles in sunscreens do not permeate the skin or pass into living skin cells in humans, and are therefore not a health risk. Antioxidants may also provide benefits in terms of UV filtering and destruction of free radicals that form as a consequence of UV radiation and breakdown of other sunscreen ingredients – research into this area is ongoing.

- **I have dark skin I don't need sunscreen**

People with darker skin tend to tan easily and not burn; hence, they may not feel the need to use sunscreen. However, a tan like sunburn indicates DNA damage caused by UV radiation.

### **UV PROTECTION: KEY RECOMMENDATIONS**

1. Seek shade and minimise sun exposure, especially when the UV level is  $\geq 3$ .
2. Wear protective clothing, i.e. a wide-brimmed hat, long-sleeve shirt, pants, and sunglasses
3. Use a broad-spectrum SPF30-50+ sunscreen every day.
4. For extended outdoor activity, use a water-resistant, broad-spectrum SPF  $\geq 50+$  sunscreen.
5. Apply sunscreen liberally 15-20 minutes before going outdoors.
6. When outdoors, re-apply sunscreen at least every 2 hours, or immediately after swimming or excessive sweating.
7. Sunscreen should not be used to increase the amount of time spent outdoors.
8. Solariums or sunbeds should be avoided.

Further information on sunscreens and sun protection can be found at  
<http://www.cancer.org.au/preventing-cancer/sun-protection/>.

*This information is provided as a guide. For specific advice please ring 5689 1212 to make an appointment to see one of our Doctors with a special interest in Skin Cancer. Copyright © Robina Family Medical Centre Pty Ltd 2015.*

